



AN ASSESSMENT
OF THE RECOMMENDATIONS
CONTAINED IN NRC REPORT NO. 16075
ENTITLED
"PHENOXY HERBICIDES-THEIR EFFECTS
ON ENVIRONMENTAL QUALITY"

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Ontario

Ministry
of the
Environment

The Honourable
Harry C. Parrott, D.D.S.,
Minister

Graham W. Scott,
Deputy Minister

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PREPARED BY
THE ONTARIO PESTICIDES ADVISORY COMMITTEE

FEBRUARY, 1979

MINISTRY OF THE ENVIRONMENT

The Honourable
Harry C. Parrott, D.D.S.
Minister

G. W. Scott
Deputy Minister

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INTRODUCTION

In early August 1978 the National Research Council of Canada Associate Committee on Scientific Criteria for Environmental Quality released Report No. 16075 entitled -

PHENOXY HERBICIDES - THEIR EFFECTS
ON ENVIRONMENTAL QUALITY
WITH ACCOMPANYING SCIENTIFIC CRITERIA FOR
2, 3, 7, 8-TETRACHLORODIBENZO-p-DIOXIN (TCDD)

The monograph attracted newspaper headlines such as, "Study of weedkiller peril urged by research group." (Appendix I)

Under the authority of S. 9(3) of The Pesticides Act, 1973, the Pesticides Advisory Committee reviewed the NRC report and examined the recommendations. The Committee is satisfied that the NRC report provides an excellent reference document and that the literature is reviewed adequately. The Committee, however, is unable to conclude in every case that the recommendations in the NRC report reflect the contents, and does not agree with several of these recommendations. This report contains the Committee's commentary on the NRC recommendations, as well as some general comments on pesticides prompted by the NRC report. The comments are designed only to indicate priority for the Province of Ontario, and may not suggest priority in a national context.

COMMITTEE POSITION

Phenoxy herbicides such as 2,4-D have been widely used in Ontario since 1947, and, with the exception of some mortality to bees, no serious adverse effects to man or animal have been reported. However, there may be certain individuals, representing an extremely low percentage of the population, who are allergic to the phenoxy herbicides or the solvents used in the formulations.

Legislatively, all pesticides including phenoxy herbicides must be federally registered under The Pest Control Products Act administered by Agriculture Canada, with input by various Ministries, including National Health and Welfare, and Environment Canada. At the provincial level in Ontario the transportation, distribution, storage, sale and use of phenoxy herbicides are controlled by The Pesticides Act, 1973.

Since the introduction in Ontario of pesticide classification in 1972, highly volatile formulations of phenoxy herbicides have been restricted to permit-use, and no permits have been issued. Access to low volatile formulations is limited to agriculturists and qualified licensed applicators, while amines, being relatively non volatile, are available to the general public in accordance with registered uses. The commercial use of amine formulations is, however, governed by the Act and Regulations.

It is the opinion of the Pesticides Advisory Committee, that the current controls surrounding the use of phenoxy herbicides in the Province of Ontario are adequate. However, certain aspects relating to pesticides in general are presented.

RECOMMENDATIONS

The Pesticides Advisory Committee recommends that:

1. In reporting pesticide research the formulations used in experimental work be identified by formulation source and batch number. (I. B)
2. Ministries of Labour and/or Health review the need for quantitative data on the levels of exposure of humans to pesticides in manufacture and application. (I. E)
3. The Federal Government examine its monitoring capability to see if it meets the current need for Canadian TCDD residue data as well as residue data on other contaminants. The facilities should be identified. (II. C)

COMMENTS OF

THE ONTARIO PESTICIDES ADVISORY COMMITTEE (OPAC)

RE: RECOMMENDATIONS CONTAINED IN THE NRC REPORT ON PHENOXY HERBICIDES

Recommendation I. A (NRC Report, page 11)

Information be compiled on the regional use patterns and extent of use of the phenoxy herbicides, their various formulations and the associated additives.

OPAC COMMENT

USE PATTERN IN ONTARIO IS BEING COMPILED BY O.M.A.F. AND O.M.N.R. BY ACTIVE INGREDIENT BUT NOT BY ADDITIVES. ADDITIVES ARE CONSIDERED BY THE FEDERAL GOVERNMENT AS PART OF THE REGISTRATION PROCEDURE OF FORMULATED PRODUCTS, AND MANUFACTURERS PROVIDE THE OCCUPATIONAL HEALTH BRANCH OF NATIONAL HEALTH AND WELFARE WITH POISON CONTROL CARDS WHICH INCLUDE INFORMATION ON TOXIC ADDITIVES. HOWEVER, MORE INFORMATION ON ADDITIVES AND THEIR ENVIRONMENTAL IMPACT SHOULD BE MADE AVAILABLE TO PROVINCES.

Recommendation I. B (NRC Report, page 11)

- i) More adequate documentation be presented on the chemical constituents of spray mixtures used in research programs and large-scale spray operations.
- ii) Studies be initiated to delineate more adequately the environmental behaviour of these additives.

OPAC COMMENT

IN ONTARIO THICKENING AGENTS DESIGNED TO REDUCE DRIFT, OR OIL TO IMPROVE FOLIAR PENETRATION ARE THE ONLY INGREDIENTS ADDED TO PHENOXY SPRAY MIXTURES.

Recommendation I. C (NRC Report, page 12)

- i) Studies be initiated to determine if significant quantities of the volatile phenoxy herbicide formulations are transported long distances to other ecosystems.
- ii) If the volatile formulations are to be used, careful quantitative assessments be made of the atmospheric levels of phenoxy herbicides which are likely to cause damage to sensitive plants. Less volatile derivatives of the phenoxy herbicide are available.

OPAC COMMENT

NOT A PRIORITY AREA OF STUDY IN ONTARIO SINCE THE HIGH VOLATILE PHENOXY HERBICIDES ARE NOT USED.

RESIDUE DATA FROM DRIFT STUDIES IN ONTARIO USING AMINE AND LOW VOLATILE ESTER FORMULATIONS ARE AVAILABLE.

Recommendation I. D (NRC Report, Page 12)

The validity of generalizations about their toxicity extrapolated from studies with limited numbers of herbicides be clearly demonstrated.

OPAC COMMENT

REGISTRATION OF PESTICIDES IS THE RESPONSIBILITY OF THE FEDERAL GOVERNMENT.

Recommendation I. E (NRC Report, Page 13)

Priority be given to:

- i) The compilation of quantitative data on the levels of exposure encountered by personnel in the field during aerial and ground-rig applications of sprays.

ii) The determination of whether women of childbearing age are in the critical group i.e. are women of this age group involved in the application of these herbicides.

iii) The prospective epidemiological examination of the critical group be undertaken. The study should explore the relation between any symptoms and at least the following factors:

- a) Application technique (aerial or ground-rig);
- b) Formulation (e.g. ester, amine, etc.); additives in the spray mixture (e.g. emulsifiers, solvents, etc.);
- c) Protective measures taken by the applicators and field help;
- d) Climatic and geographic factors.

iv) Studies should be designed to examine the chronic long-term toxicity, including carcinogenicity, and to better define the reproductive effects of these compounds, using exposure regimes mimicking worst-case situations encountered by members of the critical group.

OPAC COMMENT

THE BODY OF THE NRC REPORT DOES NOT SUPPORT A CONCLUSION THAT HUMAN HEALTH IS A MAJOR CONCERN WITH THE USE OF PHENOXY HERBICIDES. IN A MORE GENERAL CONTEXT SOME DATA ARE AVAILABLE ON EXPOSURE LEVELS OF PESTICIDES TO FIELD WORKERS IN ONTARIO. THE ESTABLISHMENT OF THRESHOLD LEVELS OF HARMFUL CHEMICALS IS THE RESPONSIBILITY OF MINISTRIES OF HEALTH THROUGHOUT THE WORLD.

EPIDEMIOLOGICAL INVESTIGATIONS ARE THE RESPONSIBILITY OF HEALTH AND/OR LABOUR AGENCIES.

Recommendation I. F (NRC Report, pages 13-14)

- i) Sales and use patterns, especially of the more toxic ester formulations, be examined to determine which specific types of aquatic ecosystems are most likely to be at risk in Canada.
- ii) Particular attention be given to the impact of phenoxy herbicides on the productivity of aquatic ecosystems under conditions relevant to the critical situations identified in i).

OPAC COMMENT

THE USE OF PHENOXY HERBICIDES IN AQUATIC ECOSYSTEMS IS VERY LIMITED IN ONTARIO, AND IS SUBJECT TO PERMIT REQUIREMENTS UNDER THE PESTICIDES ACT, 1973. SOME RESEARCH ON THE IMPACT OF PHENOXY HERBICIDES IN AQUATIC ECOSYSTEMS IS IN PROGRESS.

Recommendation I. G (NRC Report, page 14)

Spray operations involving the application of phenoxy herbicides to a major portion of any single ecosystem be more closely monitored to define the long-term consequences of the associated shifts in flora and fauna under Canadian conditions.

OPAC COMMENT

THE USE OF HERBICIDES IS DESIGNED TO EFFECT FLORAL SHIFTS TO THE BENEFIT OF SELECTED SPECIES. THUS, SUCH SHIFTS ARE DESIRABLE AND ARE THE BASIS FOR HERBICIDE USE. DATA AVAILABLE DO NOT SUGGEST HARMFUL SHIFTS IN FAUNA ALTHOUGH FAUNAL SHIFTS DO OCCUR IN RESPONSE TO REMOVAL BY HERBICIDES OF PREFERRED FOOD SUPPLY OR HABITAT.

Recommendation I. H (NRC Report, page 14)

Weed populations which are treated annually be monitored for the development of resistance to phenoxy herbicides, and that potentially toxic interactions between phenoxy and other commonly used classes of agricultural chemicals be tested with pollinators, and with key beneficial invertebrates, including representative soil invertebrates.

OPAC COMMENT

RESISTANCE STUDIES HAVE BEEN UNDERWAY IN ONTARIO FOR SEVERAL YEARS. STUDIES ON POTENTIALLY TOXIC INTERACTIONS WOULD BE USEFUL BUT OF LOW PRIORITY.

Recommendation I. I (NRC Report, page 14)

Provision for the reliable identification and quantification of residues be a prerequisite for authorization of funding for experimental work.

OPAC COMMENT

THIS WOULD SEEM DESIRABLE IN THOSE RESEARCHES IN WHICH RESIDUE DATA ARE ESSENTIAL TO THE INTERPRETATION OF THE STUDY.

Recommendation II A (NRC Report, page 15)

To provide the public with easy access to this critical information, the results of programs monitoring TCDD levels in 2,4,5-T and fenoprop be summarized and published regularly in refereed journals.

OPAC COMMENT

CANADIAN DATA ON TCDD ARE VERY LIMITED TO DATE. DATA FROM THE U.S.A. AND EUROPE ARE APPEARING AT AN INCREASING RATE IN SCIENTIFIC JOURNALS. IT IS UNLIKELY THAT NRC SCIENTIFIC JOURNALS WOULD CONSIDER RESULTS OF MONITORING PROGRAMS SUITABLE FOR PUBLICATION. A MECHANISM SHOULD BE DEVELOPED TO PROVIDE INTERESTED PARTIES ACCESS TO MONITORING DATA.

Recommendation II. B (NRC Report, page 15)

A monitoring program be undertaken to examine the level of TCDD in biota from areas sprayed with these herbicides.

OPAC COMMENT

THE BODY OF THE NRC REPORT DOES NOT SUGGEST THAT THIS IS A MAJOR CONCERN. WE SHOULD, HOWEVER, MAINTAIN SURVEILLANCE OF MONITORING PROGRAMS ELSEWHERE TO SEE IF THESE EXTENSIVE PROGRAMS DETECT ANY MAGNIFICATION IN THE BIOTA.

Recommendation II. C (NRC Report, page 15)

A service laboratory be designated and charged with serving Canadian scientists requiring accurate, precise quantification and confirmation of TCDD residues in food and environmental samples.

OPAC COMMENT

NEED FOR SUCH AN OPEN-ENDED SERVICE FOR TCDD ALONE IS NOT EVIDENT. HOWEVER IT IS RECOMMENDED THAT THE FEDERAL GOVERNMENT EXAMINE ITS ANALYTICAL CAPABILITY TO SEE IF IT MEETS THE CURRENT NEED FOR INFORMATION ON TCDD AND OTHER NEWLY DETECTED CONTAMINANTS.

Recommendation II. D (NRC Report, page 15)

Studies be designed to examine the dose/response relationships between reproductive, possible immunosuppressive, and other sublethal effects of TCDD in terms of the actual exposure regime encountered by the critical group, e.g. agricultural workers.

OPAC COMMENT

RESPONSIBILITY OF FEDERAL HEALTH AGENCIES TO COMMENT.

Recommendation II. E (NRC Report, page 16)

The effectiveness of TCDD as a promoter be examined using screening
IN VITRO procedures.

OPAC COMMENT

RESPONSIBILITY OF FEDERAL HEALTH AGENCIES TO COMMENT.

Recommendation II. F (NRC Report, page 16)

Studies be initiated with TCDD to examine the relation between
the level of TCDD in the milk of cattle and humans to the exo-
genous exposure.

OPAC COMMENT

RESPONSIBILITY OF FEDERAL HEALTH AGENCIES TO COMMENT.

Recommendation II. G (NRC Report, page 16)

If materials containing fenoprop or 2,4,5-T are used in such a
manner as to contaminate aquatic systems, laboratory studies be
initiated to examine the effect of TCDD on the reproductive potential
of fish and benthic invertebrates using exposure regimes relevant
to those occurring in the field and that the degradation and move-
ment of TCDD in these systems be examined. Alternatively, it is
recommended that products containing 2,4,5-T and fenoprop only be
registered for use where aquatic systems will not be contaminated.

OPAC COMMENT

*THERE ARE CONSIDERABLE DATA IN THE SCIENTIFIC LITERATURE ON
THE EFFECTS OF 2,4,5-T IN FISH AND BENTHIC INVERTE-
BRATES. THESE DATA INDICATE THAT AT EXPOSURE REGIMES
RELEVANT TO THOSE IN THE FIELD THERE ARE NO MEASURABLE
EFFECTS OCCURRING.*

Study of weedkiller peril urged by research group

OTTAWA (CP) — Certain weedkillers widely used throughout Canada — chemicals that may cause genetic mutation and other adverse effects — should be extensively monitored and researched, says a study by the National Research Council's subcommittee on pesticides.

The weedkillers, termed phenoxy herbicides, include 2,4-D, 2,4,5-T, fenoprop and dichlorprop. The most commonly used herbicide is 2,4-D, with 1976 sales approaching 4.5 million kilograms.

The 400-page study says potential health hazards would be increased by exposure to herbicides during their manufacture and application.

A general survey of 3,300 Saskatchewan grain elevator operators and farmers showed that 20 per cent suffered ill effects during seasonal spraying of 2,4-D. Symptoms included nausea, loss of appetite, weight loss and occasional vomiting.

"The symptoms observed one year were often more extreme than those observed in previous years, requiring a number of farmers to contract out their spraying to other operators," the study says.

Operators have also reported headaches and double vision following 2,4-D spraying.

"In terms of human exposure to phenoxy herbicides, health effects from operational spraying have not been properly monitored in Canada," the study said.

Tests have confirmed genetic mutation in laboratory animals, the study says, although no such effect

on humans has yet been proved.

"However, the possibility of such effects warrants the maintenance of a program monitoring food for phenoxy herbicides and TCDD residues . . ."

The extremely toxic compound, TCDD, found in 2,4,5-T and fenoprop, was of particular concern to the subcommittee.

Reported effects and test

results using varied doses of TCDD on laboratory animals ranged from liver damage and genetic mutation to death. A number of adverse reactions have also been reported in humans after accidental exposure to the compound.

The phenoxy herbicides are relatively non-toxic to mammals and birds, the study says, although livestock deaths have been linked to the chemicals.

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